Notebook Series -- Notebooks by Experimenters Other Than Edison
Navy and Wartime Research Experiments -- A. M. Kennedy Books
Notebook, N-17-08-27

This notebook was used by Absalom M. Kennedy during August-October 1917 for notes on experimental work for the U.S. Navy performed under the direction of Edison during World War I. The entries relate to a series of experiments, numbered from 59 through 108, on submarine torpedo detection. The experiments at the beginning of the book, which contain extensive notations by Edison, involve the use of various combinations of transmitters and receivers to listen to torpedoes fired from the USS *Emblane* at Sag Harbor, Long Island. Information is provided regarding weather conditions, other vessels in the vicinity, and the time elapsing before the torpedo was first heard, as well as when its sound was the loudest and when it could no longer be heard. There are also experiments with microphones, receivers, torpedo floats, towing ropes, and containers conducted at Gardiners Bay, Greenport Harbor, and other Long Island locations. The notes indicate that Jerry T. Chesler, E. Rowland Dawson, and Sherwood T. (Sam) Moore assisted with the work. Inserted into the book are sixteen small pages pertaining to experiments 74-80.The front cover is labeled "Experiments #5. From 8/27/17 to 10/9/17." The pages are unnumbered. Some pages have been removed from the book, and several pages of drawings have been pasted into it. Approximately 125 pages have been used.

8/27/17.

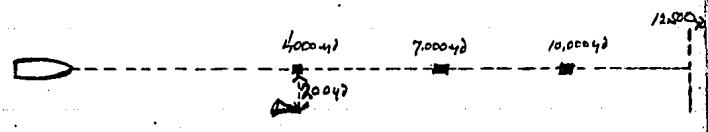
Schedule outlined by Mr. Edison for to-day.

1. Put magneto on Big Horn - .002 wire
2. Moore's Microphone on Big Horn
3. " " " Little "
4. Run your own engine, detach out.
5. If the running of your own engine dont shorten hearing distance as much as you expect, run your own launch in circle closely around your own boat. Listen in booth -

1. Time
2. Weather - wind
3. Launch or interference
4. Time to buoy
5. Landing
6. Time can drop

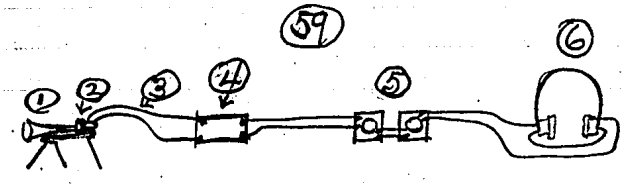
24" Bore
3000 ω head phones
Audions high

Lubooth 8/27/17.



Position - 4000 yds from Emblane
200 yds to right of course.

Weather - Bright clear morning. Wind fresh WSW, some white caps. Waves 8" to 12".



1 = small horn on tripod
2 = New .002 wire, 1000 ohm receiver.
3 = Rubber covered, stranded pair wire with steel insert.
4 = Audions set on "high"
5 = Shunt boxes set at 24
6 = 3000 ohm pair head receivers.

Lubooth

Time 9:03 am.
Wind - moderate very few white caps.
Interference Blue launch started 100 yds away at 4 minutes.

1233 yds - Time to hear Torpedo (3000 yds) 1 min - 14 sec
3916 Loudest 3" - 55"
Can't hear (3500 yds) 7" - 40 1/8"
Shot # 1
Notes:

2683 yds

Jerry in booth so could not see start or torpedo at all and he yelled when could hear, loudest, and could not hear.

Can see torpedo coming against sun only about 300 yds. Can see it running away against sun for about 6000 yds.

1233
3916
3749

1233

168
54
2350
3
117
3916
1233
2683

3916

14
50
3370
1233

[s]

In booth

(60)

Same as 59 except shunt boxes (5) set at HO.

Time 9:20am
Wind – same as previous
Interference – Bliss Launch started up in 4 min, 100 yds away

Time to hear Torpedo (2000 yds)	2 min	$00\frac{1}{5}$ sec
Loudest	4 "	15 "
Can't hear (6000 yds)	6 "	25 "
Shot #2		
4000 yds	4 "	$16\frac{2}{5}$ "
7000 "	7 "	24 "

Notes:

2000 yrds

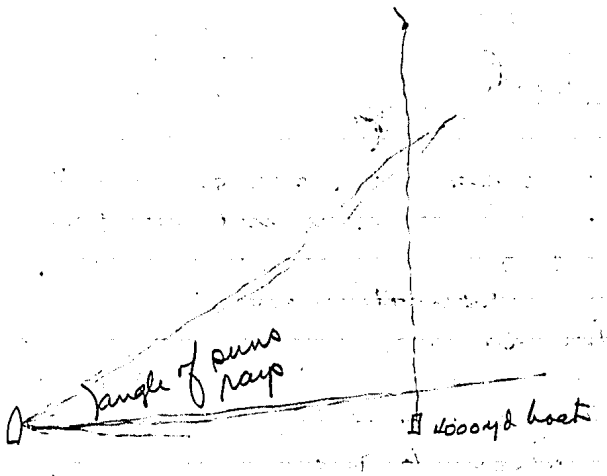
Confirmed previous notes on seeing torpedo comeing & going.

Evident can not hear as far with this set of boxes which is less sensative

$$\begin{array}{r} 255 \\ 3\overline{)1275} \\ 4250 \end{array}$$

4000 / 2

$$\begin{array}{r} 120 \\ 6\overline{)600} \end{array}$$



This torpedo had unusual amount of mist & smoke.

Could see coming for 2000 yds before it got in angle of sums rays.

Then could not see until 200 yds away.

Sun higher now making conditions different from previous experiment

In booth

(61)

Same as 59 except shunt leaves with infinate resistance so as to make maximum sensativeness.

Shot No 3.

Time 9:41 am.

Wind - less, no white caps, waves about 6" high.

Interference - Bliss launch running about 1500 yds away, stopped when torpedo started.

Time to hear Torpedo		0 min - 7 sec (?)
Loudest		4" 08"
Can't hear		6" 43"
4000 yds	NG	4" 15"
7000 "		7" 19"

Notes:

Jerry states at this sensativeness, could not tell positively when started & when stopped. Sure of torpedo sound above other noises only when loud.

See opposite page for sun condition.

Sun now pretty much up in sky.

This torpedo showed up very great amount of mist.

Could see torpedo coming 2500 to 3000 yds off. Could see going 6000 yds.

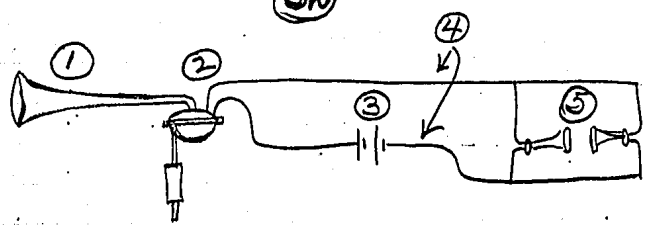
2 Bliss launches stopped when torpedo started but started after 4 minutes and at 7 minutes was 100 yds off and masked time to "Cant hear".

Rampant broadside to waves and rolling considerably.

Lubooth

Moore

(5R)



Position same as 59

Apparatus -

1 = Big horn
2 = Moores Micro-phone #1
3 = 2 cells B-2 E.S.B.
4 = #18 Twisted Pair solid wire.
5 = Two Bell receivers in parallel used on both ears.

Shot No. 4
Time 10:25 am
Wind Quiet. No white caps, only 4" to 6" waves.
Interference Bliss Launch 100 yds away at 7 min
Time to hear Torpedo (3500 yds) 0 min. 22 2/5 sec
Loudest 4 " 10 "
Cant Hear, (2500 yds) 7 " 39 "
4000 - 4:27 | 7000 - 7:47
← Notes - see opp. page.

[11]

Lubosth Moore

(63)

Same as 62

Shot # 5
Time 10:45 a.m.
Wind - Still more calm.
Interference - Bliss launch running 1500 yds away until torpedo started. Started up again in about 4 min and at 6½ min was 100 yds off.

Time to hear torpedo = Jerry yelled ½ minute before torpedo started.

Loudest	4 min 00 sec.
Cant hear (3000 yd)	7 " 15 "
4000 - 4:18	7000 - 7:28

Notes: Jerry yelled could hear torpedo ½ minute before started. This was probably Bliss launch 2500 yds away.
Torpedo had very little vapor. Could see 2500 yds comeing & 5000 to 6000 going.

Could see torpedo
3000 yds comeing
and 6000 yds going.

In booth

(64)

Same as 62 except engine of
Rampant running without
clutch in at about regular
running speed.

Spot # 6
Time 11:35 am.
Wind Light - very small waves.
Interference Bliss launch towing
torpedo running whole
time torpedo was running.
2nd Bliss launch started
up 100 yds away with min

Time to hear torpedo.	1 min	02 sec
Loudest	4 "	25 "
Cant hear	6 "	03 "
4000 - 4:11 2/5	7000 - 7:19 3/5	

Notes -
Engine running does not
seem to interfere much
if any.
2 Bliss Launches running
Jerry evidently distinguished
from these.

C15

around, all was confusion and nothing could be distinguished.
Thinks microphone the better of the two as less foreign sounds and the sound more distinctive.

Nice make test when man listening does not know when "Bell is up" or when to expect torpedo

Suggest test without horn which seems to collect extraneous sounds and give all the same characteristics, or "horn tone".

Same as previous except tender running around Rampart same time engine is running with clutch out.

Shot # 7
Time 11:57 am
Wind Quiet - no white caps - 4" waves.
Interference - Large white yacht running 1200 yds. off. B. Launch started in 4 min 100 yds off. Our launch running around boat.

Time to hear Torpedo. Jerry yelled 3 min before started.
Loudest 4 min 15 sec
Can't hear Interference too great could not distinguish
4000 = 4:17 - 7000 = 7:25
Notes: Jerry says if did not know when bell went up and when to listen for, could not detect torpedo less than 300 yds away. With the engine running, and 3 launches running

This torpedo made practically no vapor and was very difficult to see. Jumped out of water once & ran to surface two other times.

(66)

Same as 62
Jerry listened to confirm and get ready for next test.

Shot #8
Time 12:45 P.M.
Wind - Quiet - no white caps.
Interference - 1 Bliss Launch running slow 100 yds off when Torpedo started.
2 Bliss Launches met running in opposite directions about 600 yds away about 5 min after torpedo started.

Time to hear Torpedo - 1 min 27 sec.
Loudest 3 " 57 "
Cant Hear 7 " 15 "
4000 - 4:13 - 7000 - off or stopped
Notes: Hearing launch just after test Jerry says the launch sound in microphone is very similar to Torpedo sound, confirming what we found in audions. see opp page.

and run to the right.

Just previous to this while waiting, both Jerry and Moore announced several times they heard torpedoes when launches were running.

Evelane then left. No more torpedoes for day.

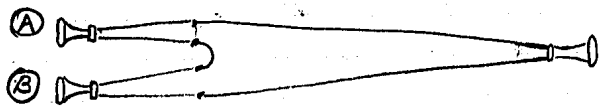
(67)

Jerry stayed down in booth from last shot to this so as not to know when ball was up or have any other warning of torpedo.

Shot # 9
Time 2=20
Wind - up trifle. No white caps
Interference - none for 2½ minutes, then launch (Bliss) #10 started towards Evelane.

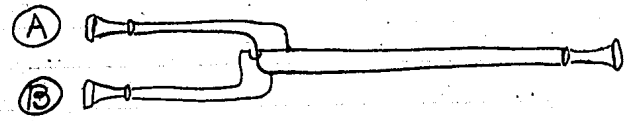
Time to hear torpedo { Jerry 1 min 27 5/5 sec
Moore + 53 3/5 "
Longest Jerry 7 min 10 sec.
Can't Hear { Jerry 8 min 40 sec
Moore 11 " 45 "
4000 7 min 13 sec 7000 - did not go
Notes: Moore put out his #2 microphone without horn and listened also.
Good shot - run only half speed. Seemed to turn about 6000 yds

Test of 1 and 2 Bell telephones used as transmitters –



1. Using in series as shown
2. Short circuiting A so as to have only B working

Could not see any difference.



1. Using in parallel as shown
2. Disconnecting A

Could not see any difference.

Dawson used receiver shunt box act at 8.

Notes:
Jerry listened on #1
Moore " " #2
Dawson " " #3
all went below deck and did not know when hail was up or torpedo fired.

On account of rough sea I could not see torpedo 200 yds coming or 500 yds going.

as neither Jerry, Moore or Dawson knew when was coming they Detected it absolutely.!!!

Jerry and Dawson both state that because of the absence of noise and "Horn tone" they can hear better without horn than with it.

Weather so rough Emblane stopped fireing.

Was Dawsons shunt off – On 8

8/28/17 Booth not used

(69)

Comparative test between:
① Moore Microphone #1
② " " #2 } No funnels
③ 1000 ohm receiver in water & audions 4 stage
What Ear phone used – 1000 ohm

All were suspended overboard, without horns, pointed toward the Emblane.
Position – same as 59 – 4000 yds from Emblane
Spot # 1
Time 9:50 am.
Wind High – 15 miles White Caps. Waves 18".
Interference – none until 4 min. Stop Launch 2 = 15 5/6
1750 yds net 2250 yards before Jerry 2000 2250
Rate to hear torpedo
① before started –
② Moore 2 min 05 sec
③ Dawson 22 sec
3634 366

Loudest	①	3 min	50 sec
	②	4 "	0 "
	③	4 "	0 "
Can't hear	①	5 "	36 "
	②	6 "	30 "
	③	8 "	40 "

4000 – 4:17 7000 Torpedo went 12000 yards – not accepted CLS

Opposite Page

8/28/17

Notes.

(69) Shot #1

Chessler heard at 1750 yds away 1600 yds afterwards

Moore " 1917 " 2500 "

Dawson " 3634 " 4666 "

notwithstanding White Caps, waves on boat, + Bliss launch going 4 minutes after start of Torpedo

This torpedo went 12000 yards did not make the 12500 yards + was not accepted

Dawson, 2 Miles - 342 ft Coming 2.65 Miles going

General Notes:

Missed 3 torpedoes, (2) not set up. The first two passed and third stopped just beyond 4000-yd scow.

(1) and (3) announced all three of these and told when first & second passed.

Long delay after third shot in which (1), (2) & (3) were set up. (1) & (2) made about 4 or 5 false reports of torpedoes each. (3) made 1 false report.

At 10:45 changed (1) from Moore's #2 microphone to #1 because #2 microphone gave false sounds.

At 11:21 changed back as more adjusted #2.

8/29/17.

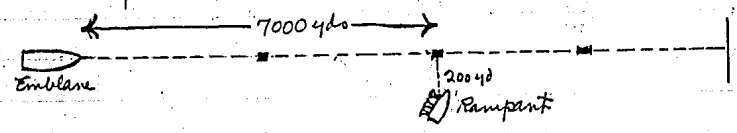
Comparative Test Between:

(1) Moore's Microphone #2 connected to 1 stage audion (Type 4 Amer. 3000 ohm ear piece) (Derry on)

(2) Moore's Microphone #1 without audion. (Moore on)

(3) 1000 ohm receiver with 4 stage audion. 80 ohm earpiece on output circuit. Shunt box set at 8. - too noisy open (Dawson on)

All Three were suspended overboard pointed toward the Emblane.



Position - 7000 yards from Emblane 200 yds off course as above

Shot # 4

Time 11:37 am.

Wind Moderate

General Notes continued =

Jerry, Moore & Dawson below & was had no warning when torpedo fired.

I saw this torpedo with glasses coming 5000 yds away. Lost it when it went through a patch of sunlight shining through the clouds.

Watch with which time was taken about 13 minutes fast so that for absolute time 13 minutes should be deducted.

Does this mean it started 2000 yards off at 7 minutes or that you noticed them

Interference: none when torpedoes were fired

Bliss launch about 2000 yds off in 7 min

Time to hear torpedo
- No 1 3516 yards Best
- 2 Doubtful - 3450 yds
- 3 2817

① 3:29
② 3:33
③ 4:11 -

Loudest hear } 3000 yds beyond

① 6:20
② 6:20
③ 6:20

Can't hear

① 9:10
② 9:05
③ 9:00

Torpedo ran 4000 yards in - 3:47 3/5
" " 7000 " " - 6:30

Notes: ① and ② announced torpedoes at 9:55 when no torpedoes were running. ① hears one at 10:07.

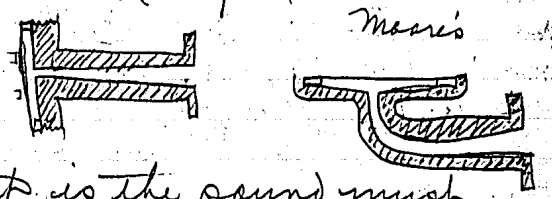
③ announced at 10:24.
② " " 10:24:10.
① " " 10:24:15.
② " " 10:28.
① " " 10:50
② " " 11:30

Must been some boat or thing imitating a torpedo as all got it simultaneously they have been 4 slaps at Dawson -

Missed 5th shot. Was mixing up lamps.

Missed 6th shot – Did not see ball up or other signals.

These under water transmitters are now shaped –



that is the sound must enter a very small opening and expand to diaphragm.

Would they not be more sensative if the diaphragms had larger openings to the water?

Missed #5 & 6

(71)

Same as 70 except to obviate hearing each other yelling signals, lamps were wired from the three and time taken from these lamp flashes.

Position: same as 70.
Shot #: 7
Time 1:27 P.m.
Wind – Brisk – few white caps
Interference Bliss launch 6000 yds off at 6 min. practically none.

Time to hear torpedo
No 1 – 3667
2 probably wrong
3 2057

Loudest 1 & 3

①	3:20 –
②	2:22 –
③	4:57
①	6:54
②	5:00 – 7:15
③	6:52
①	8:45
②	8:25
③	8:24

2050 yds with Bliss launch

Can't hear

4000 yds 4:03 3/5 7000 yds 7000 7:00

Notes:
Good fair test.
#3 Same, false signal ahead of time.

This shows
① what outside interference in the shape of launches & waves will do.

② The boys had been steadily holding pieces to ears and at attention for an hour and were probably tired.

Wind then became so high the Emblem flapped & went in.

Dawson says staying this length of time in closed up stuffy booth makes you dull + knocks the dullness out of all your senses —.

The booth can easily be Ventilated,

(72)

Same as 71 in all respects.

Position: same as 70.
Spot #8
Time 2:36
Wind – High - White Caps - 2ft waves
Interference Power sloop ran 30 yds off at 2 min masking test badly.
Bliss Launch 1000 yds at 7 min.

Time to hear	①	5:10 annul at 8:15
	②	—
	③	6:36 annul at 10:0
Loudest	①	—
	②	—
	③	—
Can't hear	①	—
	②	—
	③	—

4000 yds 3:55 7000 yds 6:35

Notes:
#3 - 1 false signal. Launch running 1200
#1 - 1 " " Launch 5000 yds aw
#1 false " " Captin boat 1500 yds aw
#3 " " Launch " 1200 y

Capt of Emblane says Torpedo gets her full contract speed 500 yards after firing - Maximum speed 5000 yards - 29 knots -

Chesler hears Emblane air Compressor all the time when at 4000 yards its a slow Thump + dont bother -

Chesler says Motor Boats sound resembles the torpedo also that there are other boats running besides Blue Boats which in future will be noted in log + approximate position by Hawley + an additional man detailed from 192 crew

Chesler says Emblane has a Dynamo, 10 KW. running all the time,

also at 4000 yards or take he heard pump of 192 going all the time

Chessler says white Caps & striking of waves against boat being down do not bother hearing the high notes of the Torpedo but Motor boats interfere badly as notes have a resemblance -

72 test -
A Power sloop 30 yards away prevented hearing Torpedo when torpedo was 5000 yards distant approaching & Torpedo was not heard at all by Dawson Moore or Chessler - while sloop was in proximity - in fact not during the run as a Bass boat started up 7 minutes after Torpedo started.

8/30/17.

Got set up. Emblane came by. Jerry without seeing her detected at 1800 yards with #1 equipment. (see description later)

Jerry gets a note from Emblane which Dawson identifies as $A^4 = 435$ N.

Jerry hears 166 pulsations per minute, probably the speed of the Emblane's engines

at 8:10 a tug with derrick slow speed tug passed. This engine was running 160 per minute. Jerry thinks it was this he heard and not the Emblane. The steam engine of the Emblane are evidently not as loud as the gas engine of this tug. This tug was moving on the same course as the Emblane but slower in speed.

8/30/17.

(73)

Comparative Test Between:

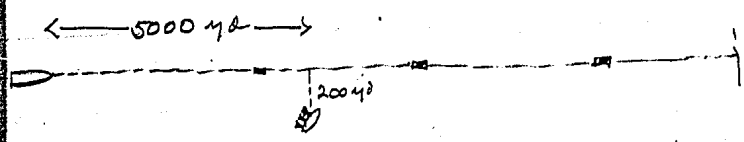
(1) = Moore's Microphone #2, connected to 1 stage audion with L Bucl (double filiment, low amplificat 3000ω ear pieces, Jerry listening.

(2) = Moores Microphone #1, straight to pair of Bell receivers. Moore listening.

(3) = 1000ω - .002" wire receiver, to input of 4 stage audion set on high with shunt box at 0. 80ω single receiver no Dawson listening.

Listeners did not know when torpedo was fired as all were below deck. Did not know when each other signalled as the signals were sent by lamp flashes.

(73 contd)



Position: 5000 yds from Enchlane (estimated) - 200 yds (est) off course.

Shot # 1

Time 9:10 am.

Wind Moderate. No white caps.

Interference:
No launches running while torpedo was running to Rampant or while test was being made.

Symbols a dash between figures thus 4-05 means minutes & seconds from time torpedo is fired.

A colon between figures means hours & minutes of the day - that is o'clock.

Three signals used.
Long flash = think I hear torpedo
Series of dashes = sure " " "
Series of dots = annulling & start over.

Jerry hears & identifies Bliss launch 2000 yds away.

(73 contd)

Time to Bear

1750 yards ① thinks 38 3/5 sec
Sure 3m-15 sec

917 yards ② sure 4m-05 sec

917 yards ③ thinks 3m-15 sec
sure 4m-05 sec

4000 yds - 4:05 7000 yds.

Notes:

① thinks he hears at 9:47 am Bliss launch 1500 yds off. ② sure he hears 9:50.
③ thinks he hears 9:51 am ③ annuls 9:55 am.
② sure he hears 9:02 am slow speed ting. annuls 9:04
① thinks he hears 9:03 am slow opd launch 2000 yds annuls 9:06.
③ thinks he hears 9:06 slow opd launch 2000 yds annuls 9:07.
① thinks he hears 9:09 slow opd launch 3000 yds.
③ thinks he hears 9:09 " annuls 9:13 7000 yds.
① annuls 9:10 am.

Errors -

(2) at 9:30 Slow speed launch 1000 yds off.
(2) annulled 9:33.
(2) at 9:34 - Bliss Launch 1000 yds
(1) " 9:35 " " " "
(3) " 9:35 " " " "
(1) annulus 9:36.
(2) " 9:37
(1) hears at 9:38 slow speed launch 1700 yds.
(3) annulus 9:39.
(1) " 9:39.
(3) hears 9:41 Bliss Launch stopped 3500 yds
(1) " 9:42 " " 5000 "
(2) " 9:42 " " " "
(1) annulus 9:43
(1) hears 9:45 Bliss Launch 1000 yds
(3) annulus 9:45 " "
(2) annulus 9:45 " "
(1) " 9:45 "
(1) hears 9:46 B. Launch stopped & started
(2) " 9:46 " " " "
(3) " 9:48 " " 300 yds off.
(3) annulus 9:50 " "
(2) hears 9:52 B Launch 1000 yds.
(4) " 9:59 B. Launch towing torpedo
(1) annulus 10:00 (2) annulus 10:01

Same as 73 except that signal system is changed. The pure & conferming signal will be omitted and only the hear and annul signals used. Also "loudest" & when torpedo passes the Rampart will be recorded as this confirms the torpedo.

Position: Same as 73.
Spot #
Time 11:43 a.m.
Wind
Interference: Bliss Launch 2000 yds off at about 1/min.

Also running a slow speed motor boat at 3000 yds & the Motor tug at 3000 yds.

(74)

→ Intermission here as men hunting for lost torpedo

Errors continued:

① hears 10:04 Bliss launch 300 yds.
① annuls 10:04
#11 launch went by at 10:18. All day pounds almost exactly like a torpedo
② hears 10:21: Bliss launch 5000 yds behind us
② annuls 10:22
② hears 10:31 Bliss launch 300 yds off
② annuls 10:32
② hears 11:02 Bliss launch 3500 yds off
① " 11:04 " " 3000 "
① annuls 11:06
③ hears 11:25 - Slow speed trig 300 yds behind boats.
③ annuls 11:27
① hears 11:32 Slow speed trig 600 yds
① annuls 11:34

Dawson says he heard it but thought was launch & could not distinguish.

4000 = 4:10

(74 cont'd)

Time to hear (366 yards)
① 3:07 (1650)
② 4:38
③ —

Loudest
① 5=02
② 6:10
③ —

Notes: When this is put into practice the listener should be where he can see the sea so that his eyes can help his ears to interpret what is occurring.

4000 yds in 4 min 10 sec

During hunting for lost torpedo off 4000 yds accounts for delay between 1st & 2nd shots.

Smoke bomb fired by Sachem
① 1 gt. noon concealed Dual boat behind.

Errors:

③ - 12:09 before fired
② - 12:09 "

L010 = 4:03

(75)

Same as 74 except V hunt more sensative, more voltage) in single stage audion.

Position same as 73.
Spot # 3
Time 12:10 P.M.
Wind: Brisk - in gusts - Mute caps. 18" waves.
Interference: Very slight. 2 slow speed launches 3000 yds away.

Time to hear
1983
① 3-01
② 30 sec before starter
③ 30 " " "

Loudest
① 4-56
② 4-56
③ 4-55

Notes:
Knew when hard was up this time.
Dawson says audions were crackling from waves and he could not be sure until torpedo was very close
Dawson says 3000 yd pair of ear phones much better than 80 yd single.

4000 yds in 4 min 03 sec

Errors: none.

(76)

Same as 75.

Position = same as 73.
Spot # 3
Time 1:04
Wind Moderate. 18' waves but no white caps
Interference: Bliss Launch 200 yds at 2-30, masking badly - Another Bliss Launch 400 yds away at 4 min.

Time to hear
① 4-30 — 500 yds
② 3-57
③ 5-00

Loudest
① 5-17
② 4-50
③ ——

Notes:
4000 yds. 4-04
Bliss launches masked badly this time.
On last two torpedoes Jerry tried receiver with resonating tube with negative results. Not as loud and could not time so as to resonate

Errors:

(3)	hears at 1:28. Launch (small) about 1500 yds away.	
(3)	annuls 1:30.	
(1)	hears 1:30 Launch 1500 yds away.	
(2)	" 1:31 " " "	
(1)	annul 1:33	
(2)	annuls 1:34	
(1)	hears 1:35 Bliss Launch 2500 yds. Launch 1500 " "	
(1)	annuls 1:37	
(1)	hears 1:39 - Bliss Launch ~~1800 yds~~ 2000.	
(1)	hears 1:41 " " 1000	
(2)	annuls 1:41	
(2)	hears 1:42 Bliss Launch 700 yds.	
(2)	annuls 1:45	
(1)	hears 1:51 nothing in sight.	
(2)	" 1:52 " " "	
(1)	annuls 1:53	
(2)	" 1:54	
2	" 1:57 while torpedo running.	

(77)

Same as 75.

Position - same as 73.
Shot #4.
Time 1:54 P.M.
Wind Moderate. few white caps.
Interference: None at start.
at 4 minutes B. Launch started at 1000 yards.

Time to hear
(1) 2-54 — 2100 yds
(2) 3-47 — 1016
(3) 3-48 — 1016.

Loudest
(1) 5-14
(2) 5-19
(3) 5-21

Notes: 4000 yds. 4-10
(1) signalled 1 min 05 sec after annulled in 2 min 30 sec
Moore & Jerry state that gusts of wind on the ropes which suspend their microphones disturb them with external noises.

Use pipes

Errors: none

(78)

Same as 74. Jerry uses L ✓ less - sensative hub again to verify.

Position Same as 73.

Shot #5

Time 2:32 P.m.

Wind Moderate - few white caps.

Interference: - Slow speed sloop with gasoline engine 1500 yds off at first after 4 minutes Bliss launch started 1000 yds away

Time to roar	①	3-15 — 1750
	②	3-36 2/5
	③	3-53
Loudest	①	4-57 2/5
	②	5-19
	③	5-04

Notes: 4000 yds 4:00

The interference was not bad. Do not know why we do not catch it as early to day as before unless it was accident before or the men grow tired and dull from being at constant attention.

Errors:

None.

Believe lack of errors in this or previous experiment due to firing being rapid or close together.

Mend dont get chance to be alone - nerves on edge from waiting and therefore fear things.

One difference to day from yesterday. Water about 27 ft deep yesterday. Does not show on chart but is 42 ft deep today at 5000 yards.

(79)

Same as 74.

Position Same as 73.
Spot #6
Time 3:47
Wind Moderate - few white caps
Interference: Bliss Launch running by at 200 yds when fired. Slow-speed sloop 2000 yds off & ran across course. Very bad interference.

Time to hear	①	3-21	1650 yds
	②	4-06	
	③	4-30½	
Longest	①	5-25	
	②	5-41	
	③	5-16	

Notes: - 4000 yds - 4-16

Interference very bad this time.

Jerry tried resonator. Could not tune to any particular note.

Errors:
(2) – 3:27 hears – 2 launches
(1) annels 3:27

(80)

Same as 74.
Dawson let receiver down deeper
Moore made microphone a little more sensative.

Position same
Spot #7
Time 3:27 P.M.
Wind Moderate – very few white caps.
Interference: Bliss Launch 200 yds away when torpedo started & kept running 4 min. Another started in 4 min

Time to hear	(1)	3-07½ 1883.
	(2)	3-32
	(3)	
Loudest	(1)	5-10
	(2)	5-31
	(3)	

Rotes: 4000 = 4-06

Dawsons audions gave trouble Noisy & knock. Batteries which had been put on fresh dropped in voltage so that too low and did not have time to cut in another cell.

2 per second.
Jerry says sound was like exhaust of factory engine - puffs.

Average of all Jerry's Readings Except the Bliss Launch one 200 yds away

1834 yards 1 WCE -

42 ft. water - was Gathered by rope vibrating -

Incandescent bulb | stage division - microfone -

(81)

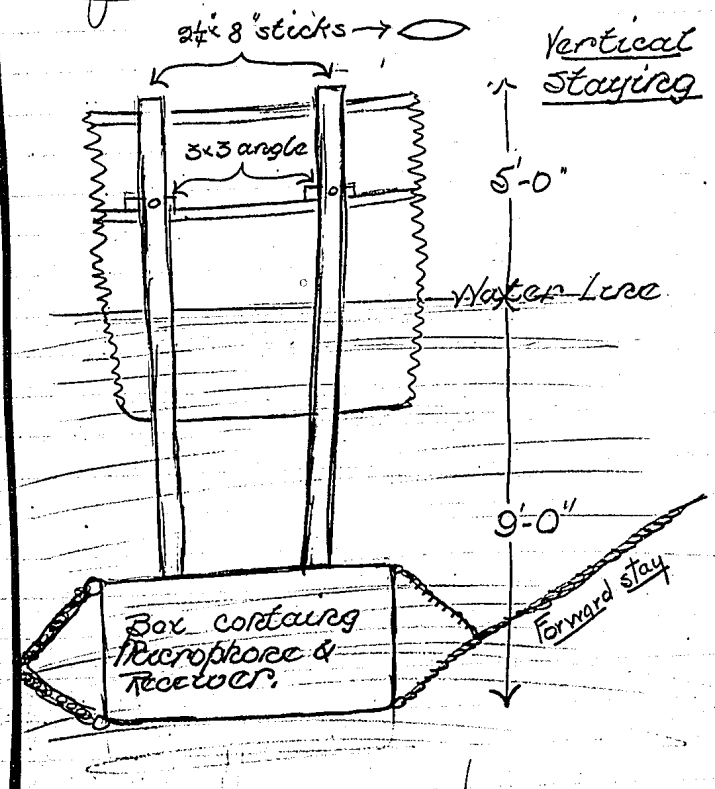
Test to see who can first hear Emblane and describe what sounds like

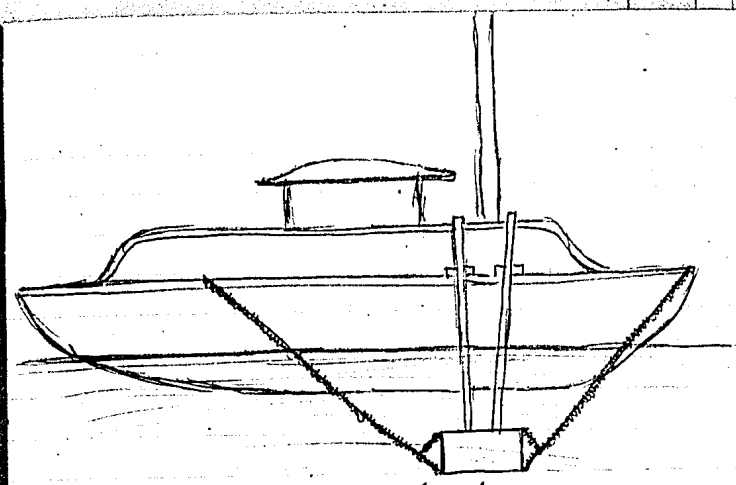
Moore hears Emblane at 2000 yds. Bliss launch 200 yds off & interferes
Dawson hears Emblane about same time.
At 1000 yds for Emblane, Jerry says launch at 400 yds going away so loud masks the Emblane. Launch sounds like locomotive going away
Jerry hears Emblane at 400 yds launch at 1000.
Moore now says he heard launch and not Emblane. Just hear Emblane at 400 yards.
Jerry says speed of Engine 180. per minute.
Moore says speed 2 per second. and describes sound as of walking beam of ferry about 2½ seconds apart. With this heard another sound about

Emblano Engine
240 Rev
Triple Expansion Eng
angle Screw
Pump about 30
Centrifugal pump for
bilge —
Forced draft fan - high notes
Generator 550 Rev
91 segments in
Commutator 4 poles →

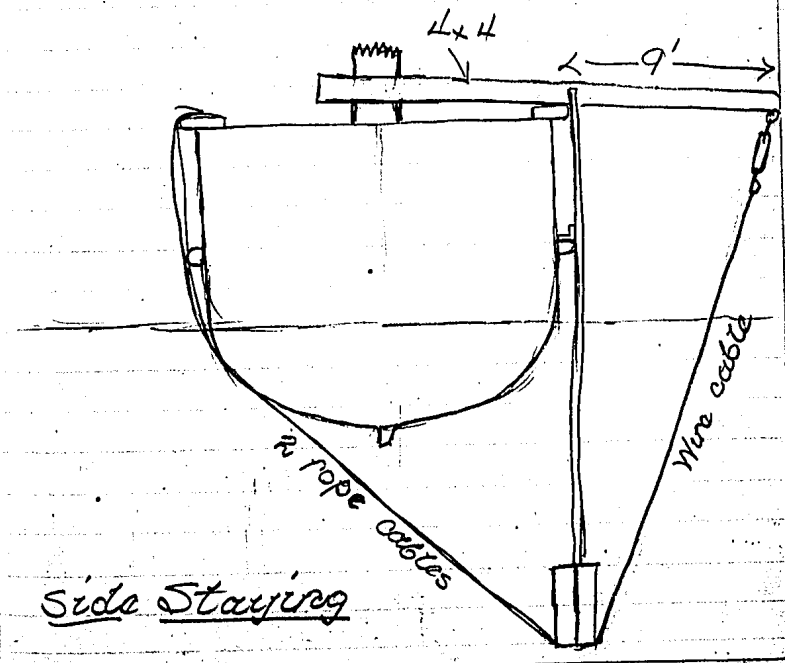
9/7/17.

Test of Moore's #2 microphone and regular #2 receiver in float attached to Rampant.

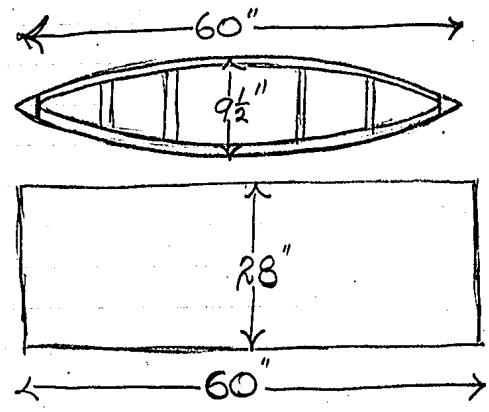




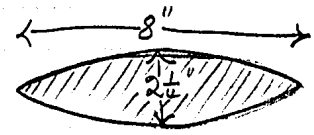
Fore and Aft staying



Side Staying



Detail of boat.



section of vertical stays.

9/7/17

(82)

Place Gardiner's Bay, off windmill on N.W. shore.

Weather Rough early in morning. Light wind, no white caps at time of experiment

Rigged up boat with Morris #2 microphone to single stage audion and pair of Bell receivers. Also with regular #2 receiver to input of 4 stage audion, output to 3000 ohm receivers.

Tested out without engine running with bell. Both quiet and sensative.

Started engine running. Both very noisy.

Started boat. At 4 miles per hour, steel cable vibrated so as to make loud, low pitched note. At 8 mi per hour vibration so [71]

violent had to stop.

Loosened all cables but kept engine running. Still very noisy – too much so to use.

Took all staying cables off leaving only the vertical stays. With engine running still too noisy.

This shows that the microphone can not be rigidly affixed to the boat as engine and other vibrations are thereby transmitted to it.

In the previous vertical stays used iron straps 3" and 8" long holding the 4"x4" uprights formed, which though heavy & stiff themselves, acted as springs because of the great mass (probably 400# or 500# when full of water) of the boat holding the microphone.

9/12/17-

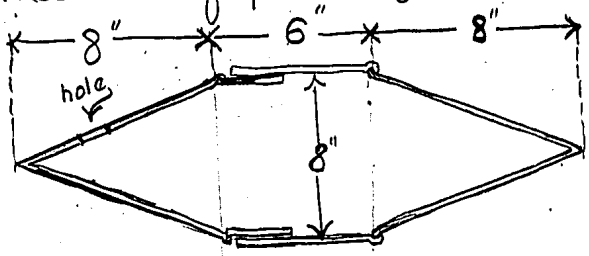
(83)

Place Greenport Harbour

Weather - Very quiet. Beautiful almost calm.

Object - To find the towing qualities of various shapes of containers for Moore's Microphone.

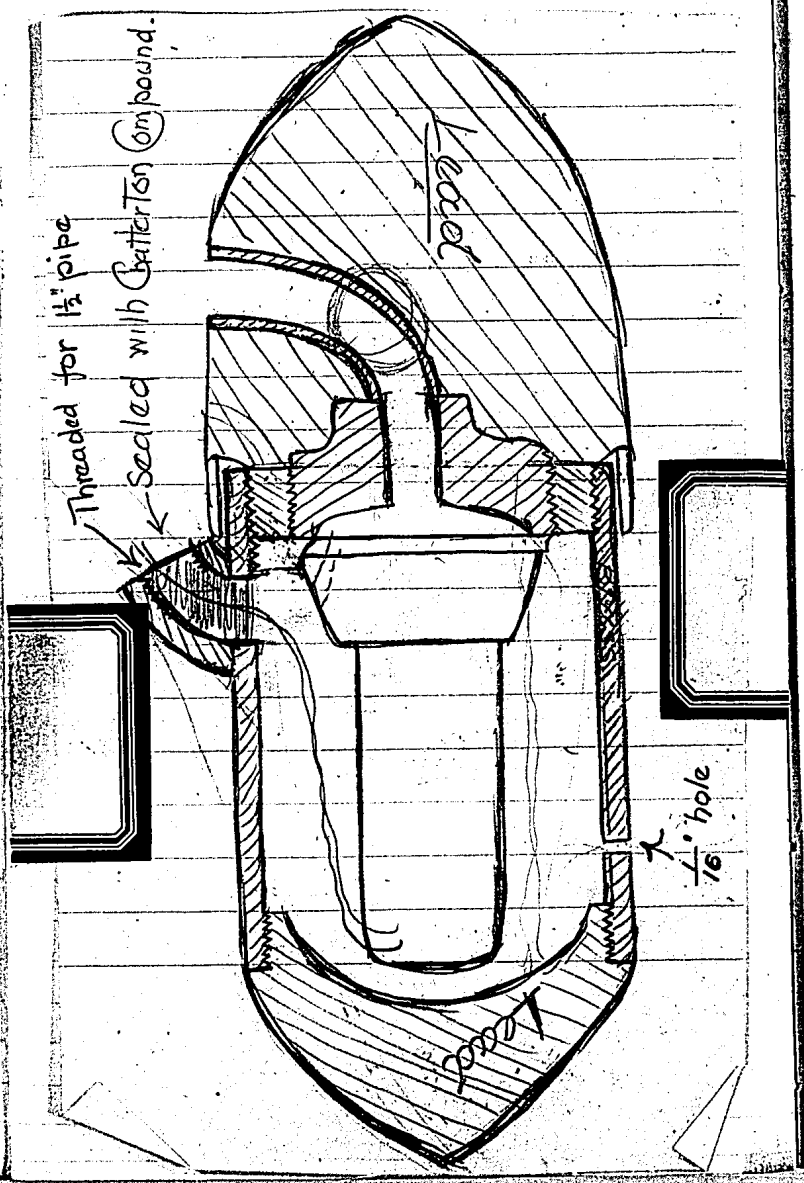
Jerry had tin-smith make up containers of galvanized iron.



① Bored hole as shown put rope through and towed from row boat at about 2½ miles per hour.

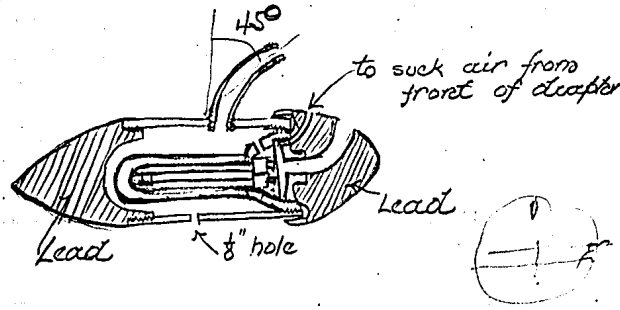
Container tailed up up at bow, but kept stable, did not tend to rotate or jump from side to side.

(2) Then took ashore and filled with sand and gravel. Showed more resistance reducing speed of row boat to about 1½ to 2 miles per hour. Jerry could not see but from alternate jerks at towing rope judged it was yawing from side to side.



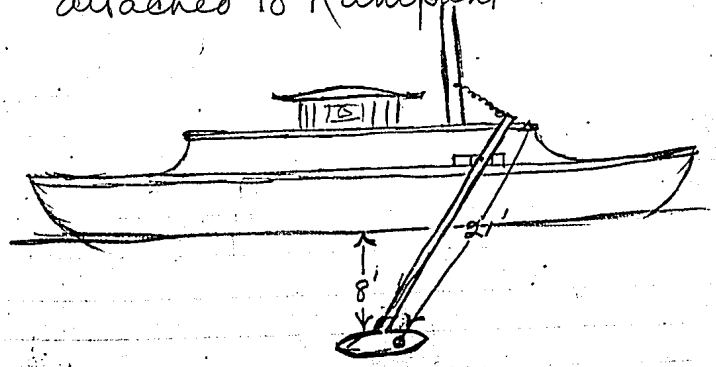
9/15/17. (84)

Test of stream-line container for 1000 ohm receiver.



First tested out 1000 ohm receiver & found working O.K.

Then assembled on 1¼" pipe and attached to Rampant

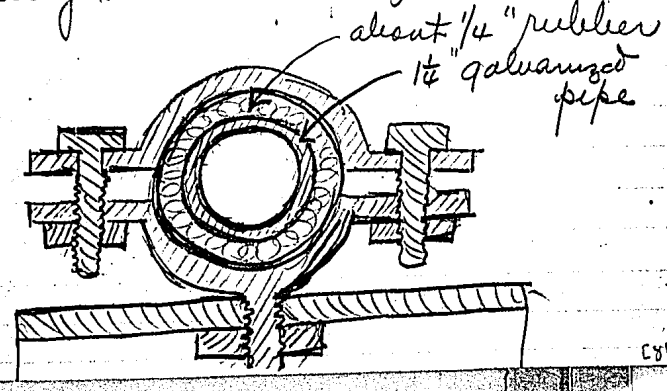


Then tested out as input of 4 stage audion

On test with bell found circuit very quiet - better than ever heard it before, also sensative and accurate. The overtones of the bell were clear, as I never heard them with audions before.

Tried thumping on deck. Found the sound was transmitted to the 1000 ohm receiver.

Put rubber between clamp and pipe to prevent vibrations being transmitted to receiver.



This deadened the vibrations from deck to some extent but not completely.

Then started engine of Rampant. Engine noise loud in output circuit of audions.

Then ran Rampant in inlet out of Queen.

The pipe and container carried nicely, and pivoting on the boat carried at an angle of about 40° with the water.

Made however an incessant deafening roar. Could not hear engine or any other noise for this roar.

On listening to end of pipe and close to water this roar seems the amplified sound of the rush of the pipe through the water.

The lead painted container seems very good. Makes the receiver quiet and sensative. Lead seems a good deadener of high frequency vibrations.

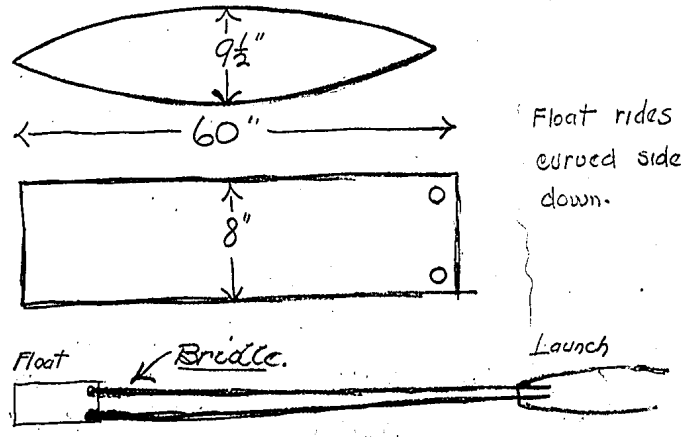
The rubber padding between tube and deck support seems to absorb vibrations from deck to tube to some extent

The water swirling around the 1/4" pipe makes considerable noise even at 7 or 8 miles per hour the vibrations of which are conveyed to the receiver as a continuous roar.

It may be possible to put a flexible connection between the container and pipe and get rid of a great deal of this noise.

9/17/17.

Test of float (85)



Float rides curved side down.

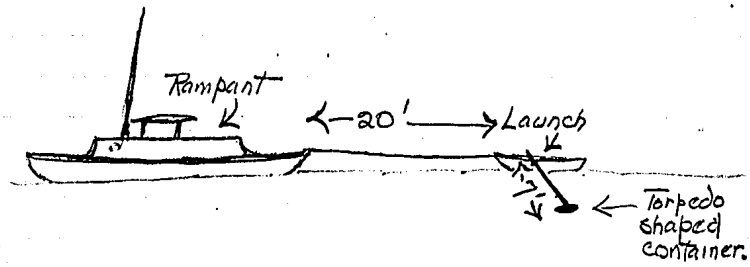
(1) Towed float about 10' behind launch. Launch running about 6 miles per hour.

Float ran submerged but shifted from side to side.

(2) Then lengthened to about 25 ft.
Float remained submerged and continued to make from

side to side.

No ballast was put in float. It had holes so that it contained water.



Torpedo shaped container of screen fastened to side of launch & towed by Rampant. Container fastened to 1½" tube, roped to side of launch.

1000ω screen connected to input of audions.

(1) Listened in Rampant slice. Output very quiet and seemed sensative

(2) Listened in wrich engine of Rampant running, clutch out & boat not moving.

Could hear engine quite plainly - loud.

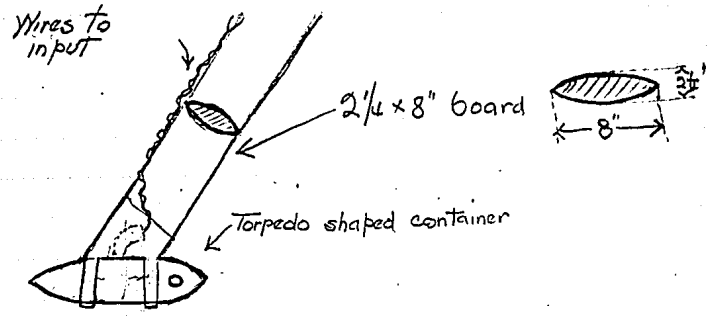
(3) With Rampant under way about 8 mi per hour.

Noise very much increased so much so ~~that other~~ sounds could not be distinguished.

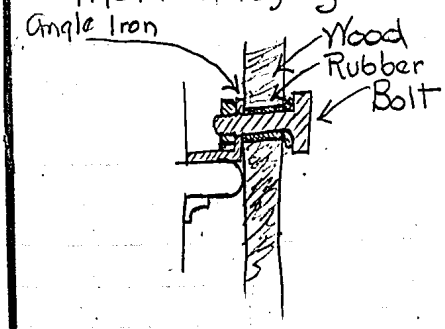
(4) Rampant under way with engine stopped entirely. While at any speed noise still quite loud. Noise diminished with speed.

9/18/17. (86)

Test drawing Torpedo shaped container through water with stream line board.



Method of fastening to Rampant.

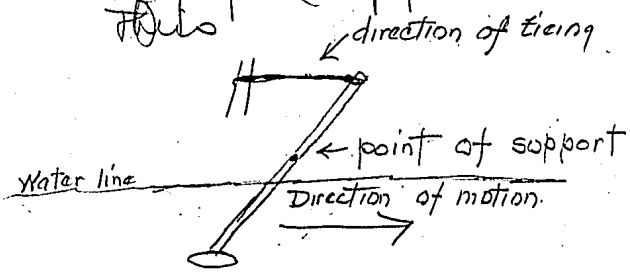


Note

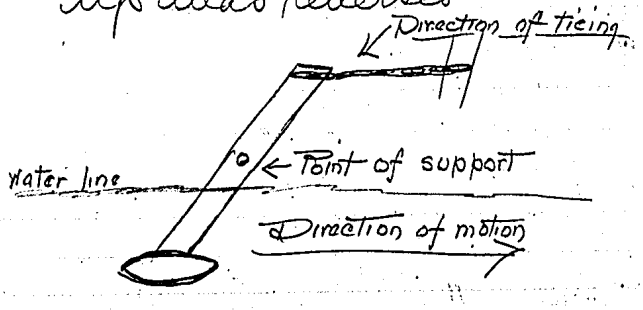
Stream line of plank diminished friction to a considerable degree as compared with round pipe.

Both hung at 4:50

With pipe it was necessary to pull backward on top of pipe supported below this



With wood direction of tieing up was reversed



(1) Tested with engine of Rampant still.
Audions very quiet, sensative.

(2) With Rampant's engine running but not under way.
Could hear engine in audion plainly but not as loud as with iron pipe formerly used.

(3) Rampant under way.
Quite noisy. Not as much as with iron pipe formerly used but still too noisy for service.

(4) Rampant under way but with engine stopped.
Not as noisy as with engine running but still too noisy for service.

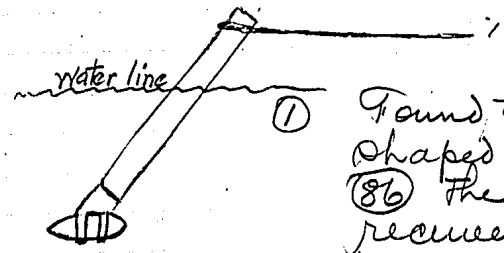
This noise could be heard by putting ear to top of wood piece and is due to rush of water.

[95]

Jerry describes this noise as the tinkling of dropping water and this is greatly amplified by audions.

9/19/17. (86)

Attempts to get receiver container mounted on board to tow without sound conducting fastening to Rampart.



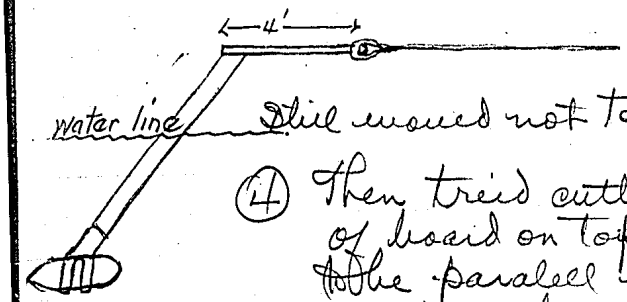
(1) Found that with shaped plank as (86) the plank with receiver floated and balanced upright in water.

(2) Then tried towing dragging with rope as shown above. Would not tow but could balance with hands so that it would tow.

(3) Nailed stick about 4 ft long on top as shown

Notes:

When



Still moved not tow.

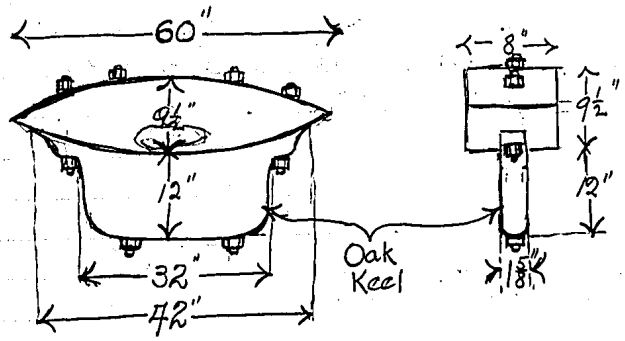
(4) Then tried cutting angle of board on top so as to be parallel with surface of water when running. Still moved not tow except when managed by hand.

Note - Bolt heads are above surface of float.
This was built rough, to use material on hand.
- not smoothed up. →

9/19/17

(87)

Towing Float in (85) with keel.



Float as used in (85) fitted with 12"×42"×1⅝" oak keel.

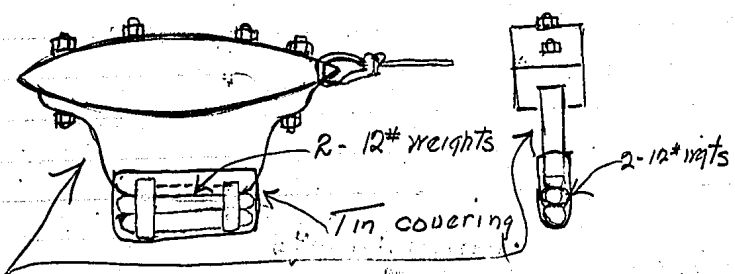
The float portion 9½×60 is perforated and fills with water.

Jerry towed this model behind launch, running at about 4 miles per hour.
Model submerged, towed steadily without jumps sidewise or vertically.

Note – Surface of float and keel ROUGH – and with bolts etc. projecting →

(88)

Towing Float with weighted keel.



Same as (87) except, 2, 12# cast weights fastened to bottom of keel and covered with sheet tin.

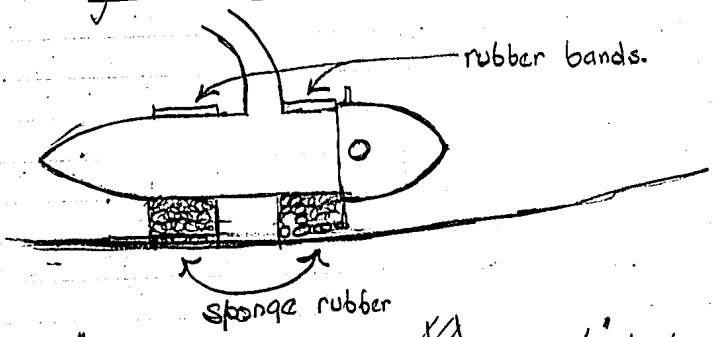
Towed behind launch at about 4 miles per hour.

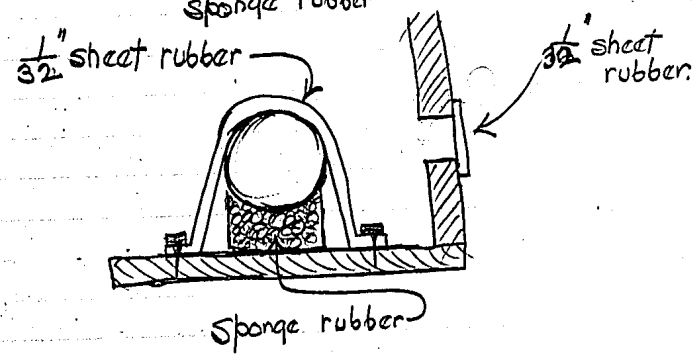
Stayed under water and towed nicely without jumping either horizontally or vertically.

9/20/17

(89)

Listening to sounds with float towed as in (88).



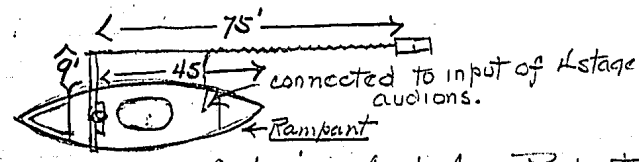


Details of fastening torpedo shaped container to float.

Same float as in (88). except ~~that~~ the covering of weights was removed.

9/21/17

(90)



Method of towing float from Rampant.

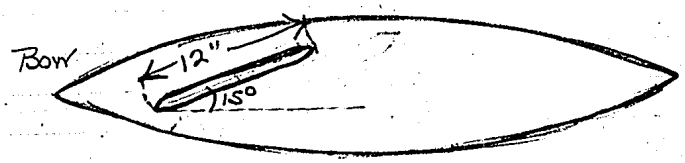
A When running slow about 3 miles per hour, float was submerged, rode steadily. Jerry could hear sound of Rampant's engines running with clutch out but very little other noise.

B When speeded up, about 8 miles per hour, before the float came to surface, engine noise increased but very little other noise.

After running a minute or two float would come to surface and turn over. Noise then very great

90 continued

Fins were then placed on the sides of the float to hold under water while under way. These were of wood 4" x 12" x 3/4" placed about 12" from bow of float at angle of about 15°.



c Float was towed with 75 ft rope.

At 4 miles per hour remained below surface, rode smoothly. Heard engine of Rampant. Very little other noise

At 8 miles per hour. Remained below surface. rode smooth. Heard engine of Rampant very little other noise.

With engine of Rampant stopped. Very quiet. Could hear launch 600 yds away.

CIII

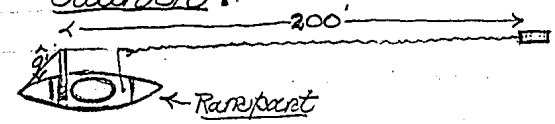
D. Then let out about 200 ft rope.
Rode smooth at 8 miles per hour under surface.
Engine of Rampant as loud and plain as C.
Stopped engine. Very quiet. Heard launch 1000 yds. away.

This float was very crude. Boat heads and other projections to make ripples. Even with its projections it proved that at 8 miles per hour the noise of drawing the receiver in a float or container could be eliminated. Noise if engine of Rampant was not eliminated.
A steamer with Rowenn have very much less engine noise

9/22/17

(91)

Determine how far can hear launch.



Towed float holding 1000ω receiver connected to input of audions 200 yds from 9' boom on Rampart.

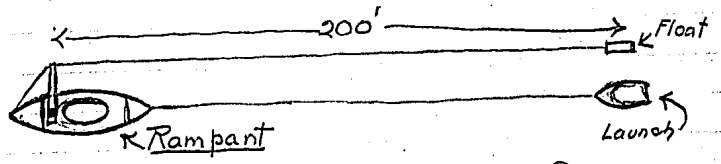
Dropped launch at Jennings Point (Shelter Island Sound). Ran 1500 yds (determined from map) away stopped engine of Rampart and listened for launch.

Jerry could not distinguish launch but could hear plainly an oyster boat about 800 yds. away.

9/22/17

(92.)

To determine how float rides at speeds and at what depths.



Observed float from launch towed close to float.

At 4 miles per hour (estimated) float ran 1½ to 2 ft under surface and dived up and down slowly.

At 8 miles per hour (estimated) float ran 6 ft under surface and ran very even & smooth.

9/23/17.

(93)

A. Mr. Edison listened to engine and noted engine noises
Then listened in on audions with input connected to 1000$^{\Omega}$ receiver torpedo shaped receptacle in towing float as in (89).
Said that the audion noises did not correspond to the engine noises and were therefore from some other source, probably from the shaking of the audion bulbs due to vibration of boat.

B. Directed that the diaphragm be removed from the receiver to determine whether this noise was due to vibration of audion bulbs from shak of boat or from air and other noises picked up

outside.

Removed diaphragm and connected receiver to input of audions and started engine. Found no pronounced noise except clear cut clicks, twice the number of revolutions of the engine.

On disconnecting one of the make & break wires these clicks changed from

- -

to -

and are probably due to the magnetic inductive effect of the make & break coil as these contacts are made.

9/23/17

(94)

Test to determine speed of Rampart.

Ran between Breakwater off Young's point and red buoy off Fanning point in Greenport Harbor. These scale 2000 yds on chart.

1. West – With wind and tide.
   Made 2000 yds in 8½ min.
   Average Engine Speed 254 R.P.M.
   = 1760 yds in 7½ min or 8 miles per hour
   (Engine missing)
2. East – against wind and tide.
   Made 2000 yds in 12 min
   Average Engine Speed 237 - R.P.M
   = 1760 yds in 10½ min or 5¾ mi. per hour.
   (Engine missing badly)
3. West, slow speed – With wind and tide
   Made 2000 yds in 13 minutes
   Average Engine Speed 159 R.P.M.
   = 1760 yds in 11.44 min or 5¼ mi per hour.

This gives Rampant speed of 6.8 miles per hour in still water as speed run, or taking both at 254 R.P.M. = 7.1 miles per hr.
With engines running well, Rampant will make about 8 miles per hour at full speed.

Wind and tide apparently amounted to 1.8 miles per hour.

Taking lowest speed at 5.25 miles per hour with wind & tide gives Rampant 3.45 miles per hour at lowest speed.

Will repeat these tests when engine is running good.

9/23/17.

Towing Float with long line.

Let out float without reamer on long line.

at 300 ft - pull 180# rides well
at 500 " - " 240# " "
at 1000 " " 300# " "
about 4 ft under surface.

The pull is estimated by Jerry from number of men to pull him.

Rampant was run at full speed or about 7 miles per hour as engine was running badly.

With 1000 ft of line out the speed of Rampant is noticeably reduced.

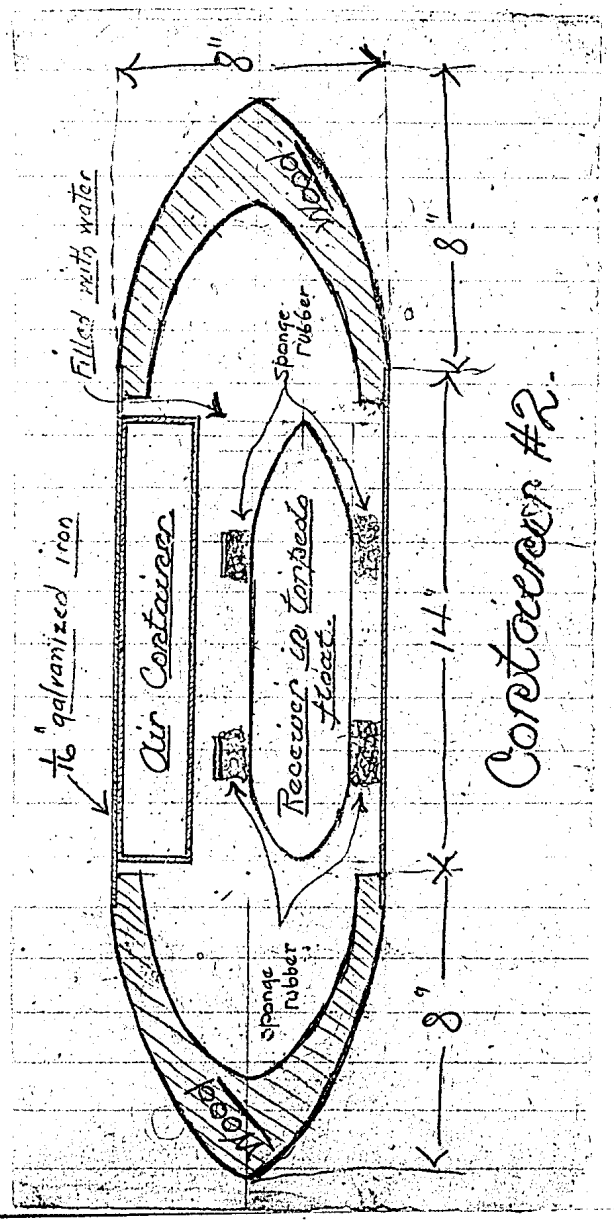
9/24/17.

Worked on engine of Rampant. Jerry found exhaust value of 1st cylinder out of time and corrected. Also found value needed grinding.

Left Sag Harbor. Engine ran 270 R.P.M. and showed good speed. Later however slowed up and showed 1st cylinder slipping -

Between 1st buoy in Noyack Bay and Red Buoy off Paradise Point, 3350 yds took 18 min at 236 R.P.M. or at 6.3 miles per hour.

On getting in took out exhause value of 1st cylinder and found bot seated. Decided to grind values of Rampants engine.



9/25/17.

Worked more on Rampant Engine. Got container #2 from Mead and Chute.
Had wooden ends which were sectional, held together with nails and painted. Removed in torpedo float put in place. Extension tube made to suck out air:

On Run of Rampant, made 270 R.P.M for few minutes. Then skipped, ran badly & speed down to 230 R.P.M.

Ground all valves. Got jump spark to work.

9/26/17.

Jerry took out strainer of Carburetor and found clogged. Cleaned and put back. Tested engine and ran speed as high as 350 R.P.M. while under way.

Made speed test of Rampant between breakwater and red buoy off Fanning Point - 2000 yards.

① East - 2000 yds 6min 45sec. Av. Eng Spd. 299.

② West - 2000 yds 9min 39sec Av. Eng. Spd. 303.

① 2000 yd in 6min 45sec = 1760 yd in 5min 56sec or practically 10 miles per hour

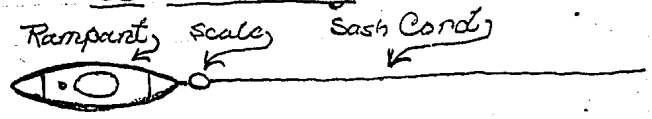
② 2000 yd in 9min 39sec = 1760 yd in 8min 20sec or 7.7 miles per hour

Average in still water 8.6 miles per hour.

9/26/17

(95)

Resistance of 3/8" sash cord to towing



Rampant running about 8.6 miles per hour less that of the pull of the cord.

500 ft cord	45#
800 " "	85#
1000 " "	92#

Then towed the float used in

(88)

with about 1000 ft of line out and before Rampant had gotten up to full speed line broke and line and float were lost

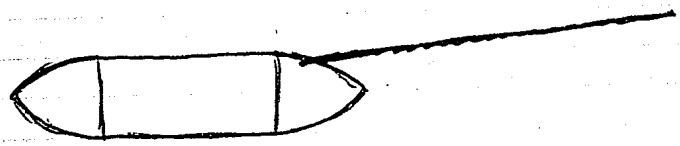
Scale showed 430# on break.

9/26/17.

(95)

Towing Container #2

Container #2 was fitted up and towed. Fastened with 3/8" rash cord as shown



Tumbled and rolled badly.

Keel, 4" broad by 14" long of 1/8" galvanized iron was soldered to bottom.

Turned upside down and tumbled as bad as ever.

2 - side fins 3" wide by 10" long were soldered to sides in addition to keel.

Turned sideways and plunged.

Keel was then removed.

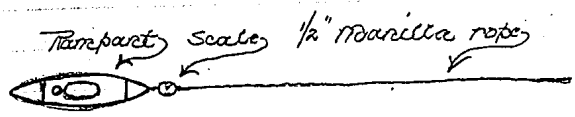
If started right side up would come to surface and plunge up and down like a porpoise.

If started up side down would try and stand nose up in water.

9/27/17.

(97)

Strain of towing 1/2" tarred Manilla Rope.



Rampant at full speed about 8 miles per hour

500' — 53#
1000' — 107#

(98)

Towing Launch.

Rampant full speed, about 8 miles per hour

Pull of launch . 155#

9/27/17.

(99)

Towing Container #2.

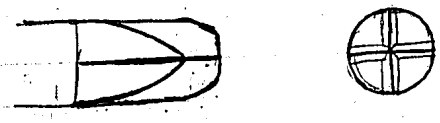
With Rampant at full speed about 8 miles per hour.

Pull with 120 ft line and wire = 30#

(100)

Change of Fins on Container #2.

A Took off all fins of yesterday and put on crossed fins on tail

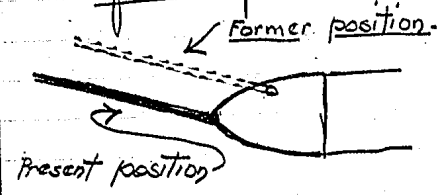


Towed steady but came to surface.

B. Side fins on tail turned down to make bow dive.

Container turned over and ran sidewise.

C. Then changed towing rope from point on top to nose.

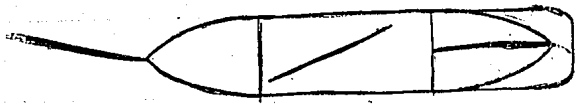


Container ran right side up, smoothly but came to surface

D. Added inclined side fins to force under water.

Container ran smoothly about 6" to 1 ft under surface.

E. Inclined horizontal tail fins to throw tail up throw down



Container ran smoothly about 2 or 3 ft below surface.

Note — It is evident that for towing models the fins and weights must be arrainged so that

(1) It will remain upright; that is will not roll.

(2) Will not dart or plunge vertically or horizontally.

(3) Will ride parallell to surface of water.

(4) Will ride at even depth which should be at least 5 or 6 ft inland or smooth waters and probably deeper, about 12 ft for open sea.

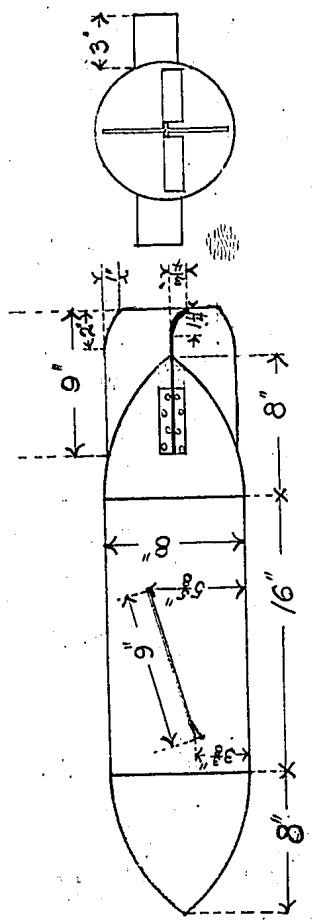
F Inclined front tips of side fins downward.

Container ran evenly 5 or 6 ft below surface which is what is desired.

This model is now satisfactory as it rides smoothly & evenly at the desired depth and with only a small resistance → about 30#. Its shape and size are convenient.

G Then connected up to Audions.

At first fairly quiet, could hear some engine noise. Then became noisy



Details of Fires on Container #12.
Scale = 1/8 size.

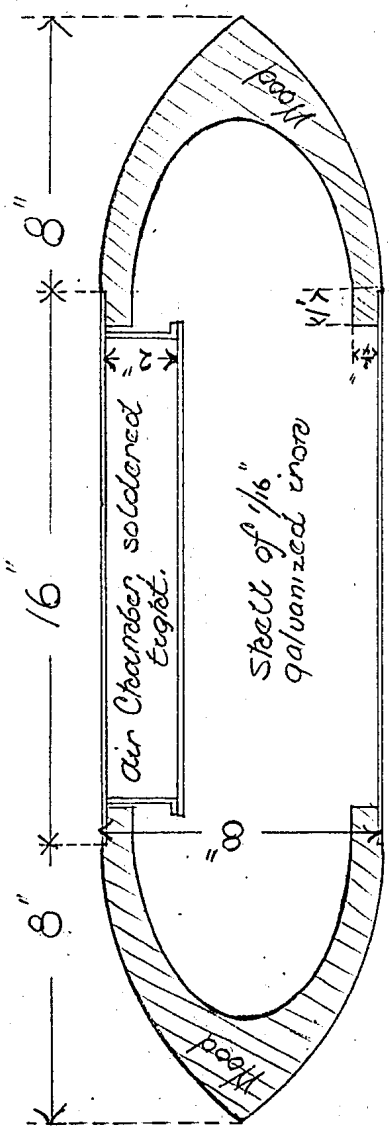
could still hear engine noises but with crackles & roars.

Tested out and found grounded.

E.M.F. of testing battery 134 Volts
" one side to ground 110 "
" other " " " 120 "

Will dry out, ~~test~~ out and locate ground.

Found ground in reimer. Dent Stanley to Orange with it to clear and reinsulate.

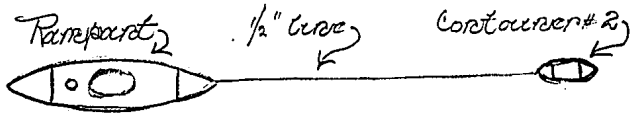


Cross Section, #2 Container
Scale = 1/4 size.

9/28/17

(101)

Test, towing Container #2 on 1/2" Manilla Line.



Ran Rampart at full speed about 8 miles per hour.

550 ft of line out = 100# pull
1000 " " " = 155# pull

Container #2 ran perfectly steady and with this long rope, Jerry estimates 20 ft under surface.

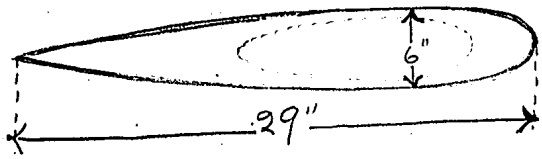
Will adjust to run less deep.

9/29/17.

Found that the air chamber of #2 container leaked and was half full of water.

Emptied it and after resoldering two or three times, soldered up so that it would remain under 30ft of water 24 hours without leaking.

Jerry had wooden stream line model made 29" long, 6" diameter



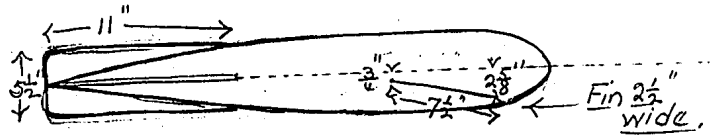
hollowed out inside.

Sent Frank and Earl after the "Hydraulic". Running short handed.

10/1/17.

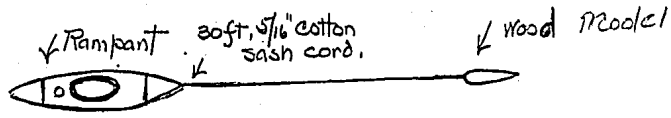
High winds, clouds and some rain.

Rigged up wooden model with tail and side fins —



(102)

Towing Wooden Model.



About 10# lead was put in cavity.

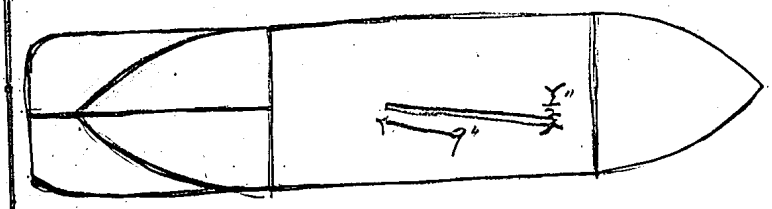
Model slee floated, but with fins under water.

On towing at about 7 to 8 miles per hour, model towed well, did not tumble or rotate but had slight motion up and down and remained about 3 or 4 feet under surface.

(103)

Towing Model #2 with small fin inclination.

Fins on #2 were changed so that the tail was straight and side fins had inclination of about 1/2" in 9".



Let out about 150 ft of line. Towed just below the surface

Now have this model towing 30 ft below surface, too deep, and at surface, too shallow, both, right side up and without tumbling or jumping which seems to show that there will be no difficulty in making a model which will tow at right depth properly.

Weather too rough, and crew too short to make depth measurements. Will do this when Hydraulic comes.

10/2/17.

Tests with Hydraulic.

Log tests.

Going towards Gardiner's Bay, against tide, towing launch.
1 mile by log in 7min 05sec = 8.5 mi per hr
Towards Greenport on way back towing launch -

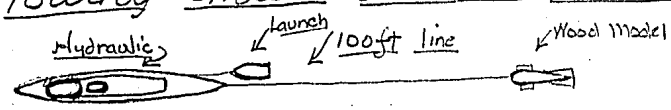
1 mile = 7 min		= 8.6 mi per hr
1 "	= 6 " 05 sec	= 9.87 " " "
1 "	= 6 " 05 "	= 9.87 " " "
2 "	= 12 " 20 "	= 9.74 " " "
2 "	= 14 " 30 "	= 8.27 " " "

It is evident that the speed of the Hydraulic varies or that the log is inaccurate.

Log showed 10 miles from Greenport to point off old fort where we van. This scales on map 10 knots. so that the log seems to read knots, not miles.

(105)

Towing small wooden Model.

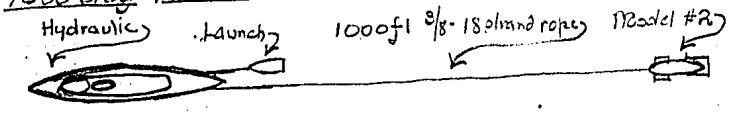


Speed of Hydraulic towing Launch 9 miles per hour.

Small wood model, towed fairly well, apparently 4 or 5 ft below surface, ran even vertically but made slight dives horizontally

(106)

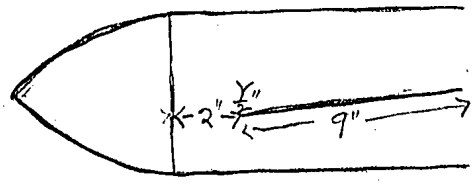
Towing Model #2.



Speed of Hydraulic, towing launch 9 miles per hour.

Model #2 had fins with 1/2 inch

in 9 inches inclination downward.



Before hydraulic got to speed, made 2 run below surface and gave pull of 280 #.

At full speed, came to surface (just awash) and reduced pull to 230 #.

Proved that inclination of fins was not enough.

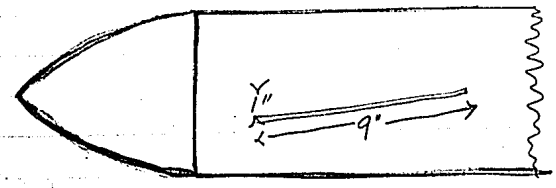
10/3/17

(107)

Adjusting Fins to get proper depth.

In (101) #2 ran too deep and in (106) not deep enough. It is therefore possible to find a fin inclination at which it should run at proper depth - believed to be about 6 ft for inside waters and 12 ft for outside waters.

Changed inclination of fins on #2 to 1" in 9".



Towed this behind "Hydraulic" as in (106).

Speed of Hydraulic 1 mile in 5:48
= 10.4 mi. per. hr.

Pull = 320 #

I dropped off in Savannah to see how deep the model was below the surface. Could not see it but from the angle of the rope estimated about 12'. It rides even, does not jump vertically or horizontally.

In this case the 1000 ohm receiver in torpedo shaped case was fastened in #7 Model.
This at the bottom as weight and the air chamber on top seems to make this tow upright without fail.

Test of insulation of receiver and wire to ground.

Connected reel to B battery (130 volts) insulated opposite end and dropped overboard (about 850 ft wire) Showed static kick on voltmeter but no steady deflection. Insulation O.K.

Then connected to receiver in model #2.
40 volts deflection one side
20 " " other
showing ground in receiver.
This while model #2 was on desk.

Took receiver out of model 2 & tested out. Showed small leakage at first with wet wires which diminished as wires dried out showing that this leakage was along the surface of the wire

Then tested receiver in torpedo shaped case in bucket of water. Showed only leak was on outside of wire.

Then made new joints and dropped #2 and wire overboard.

Showed 2½ volts deflection That is slight leak to ground. As this is the best wire we have will have to try as it is.

Then connected up to Audion input and put overboard. Shows only a little noise. This a sort of continuous roar.

Sucking the water out now presents a problem as the towing model hangs upright except when under way and then becomes horizontal

Another problem in design will be whether the model should have a positive or negative buoyancy.

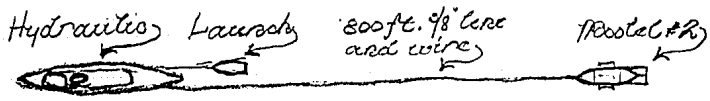
Believe that a very slight positive buoyancy will be best. One which will immerse the recover but allow the towing model to just come to the surface.

In this way it may be sucked out easily and would float to the surface if lost or breaks away.

10/3/17

(108)

Test of towing model for noise.



① Let out model #2, with #19 twisted, rubber covered wire on 500 ft. 3/8-18 strand hemp line.

At low speed, about 4 miles per hour, somewhat noisy - predominating was a pushing sort of roar - coned here also each beat of the 3 cylindered engine one louder than rest.

At high speed (about 9 miles per hour) this pushing roaring noise increased and engine noise increased proportionately. There

came in addition a slight screech, somewhat like a torpedo.
Slowed down and let out 800 ft rope and wire. (all wire we had in one piece)

At 800 ft, low speed, noise seemed less than at 500 but about same character except that engine noise was not quite as much.

At full speed (Made 1 mile in 6 min 43 sec) = 8.8 mi per hour. The noise again increased. Engines not quite as loud as before.

Then had engine stopped. Engine noise stopped. All noises diminished as speed of boat diminished and until practically dead when bumping noises showed the model was hitting bottom.

On drawing in, had picked up two long pieces of pulp.

Receiver showed O.K. No water behind diaphragm.

Next time will take

1. Bridge to measure insulation resistance
2. Bell to measure sensitiveness
3. Take up with Mr. E placing of hole and front find to avoid noise.
4. Making totally wooden model to avoid noise of metal sheet.
5. Test tomorrow effect of hole by plugging and unplugging.

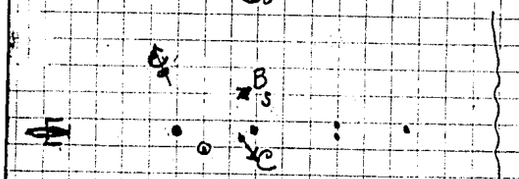
Method of depth test of running

Tighten up engineer's stop knock

Turn to get proper depth

[ITEM(S) FOUND IN BOOK]

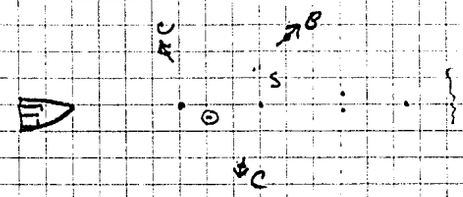
Exp 74 – 1 – 8/30-17-
30 sec



30 seconds

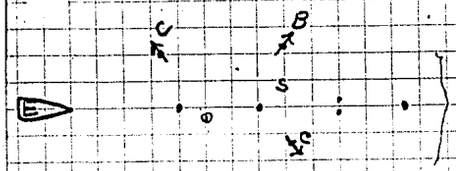
A = Bliss Boat
B = Gas. tow boat
C = Slow Mot. Boat
D = High Speed M.B.
S = Sachem
⊙ = This boat.
E = Emblane
•: Scow (at mark)

Exp 74 – 3 Aug 30-17



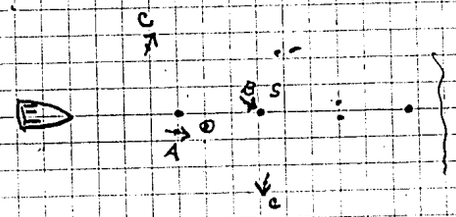
3 min

Exp. 74-2 8/30-17
1 min 30 sec



1 min 30 sec

Exp 74-4 8/30-17.



4 min 30 sec

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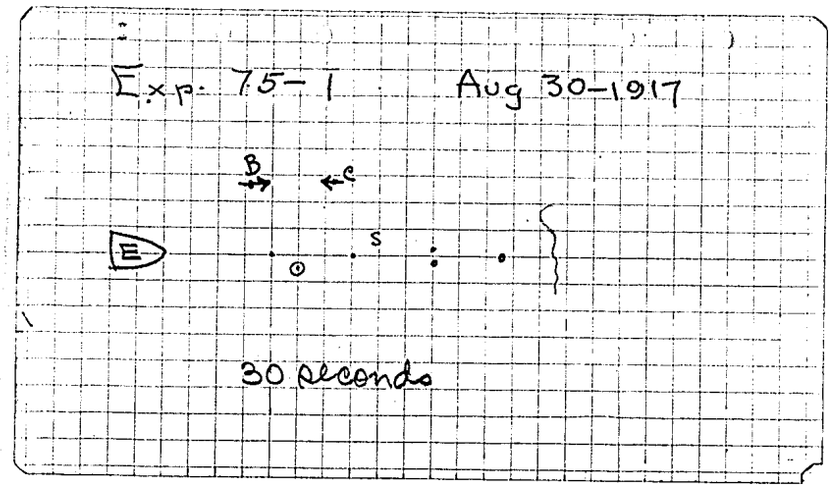
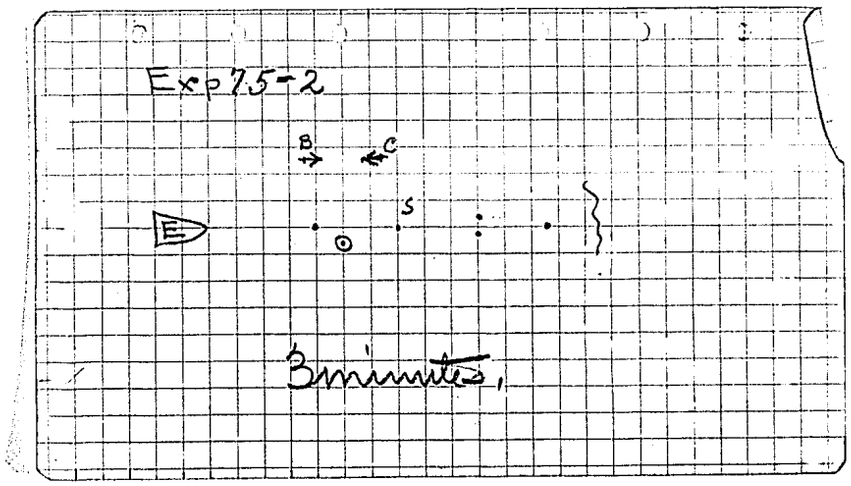




[ITEM(S) FOUND IN BOOK]

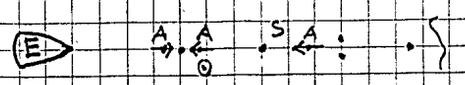
Exp 76-1- 8-30-17

start

Exp 76-2 - 8/30-17

1 min; 30 sec

Exp 76-3 Aug 30-1917



4 min

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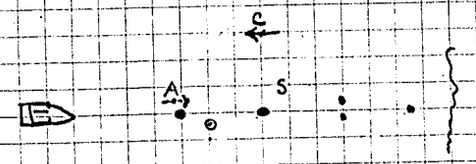
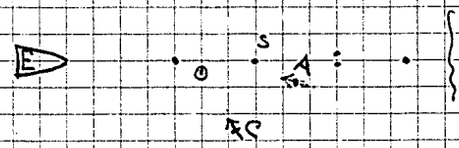
Exp 77-1 — 8/30-17

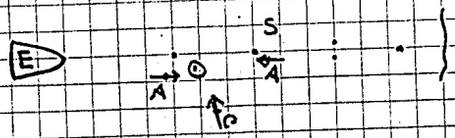


4 minutes

Exp 78-1 Aug 30-1917



Exp. 78-2 Aug 30-1917



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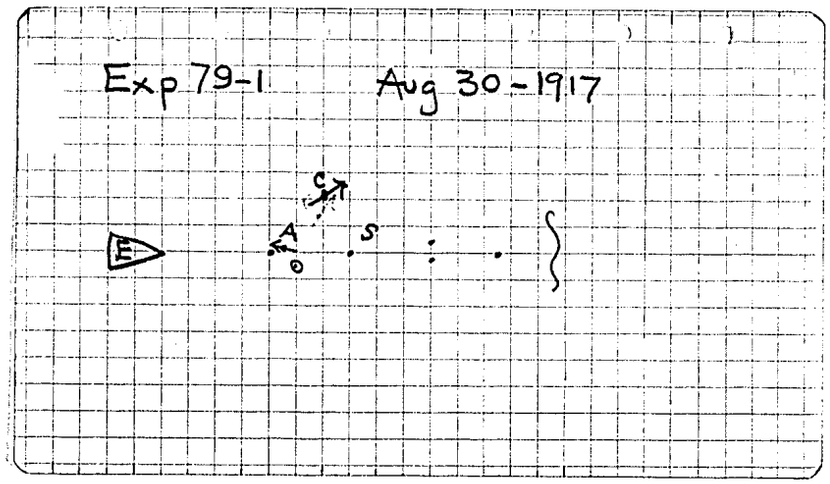

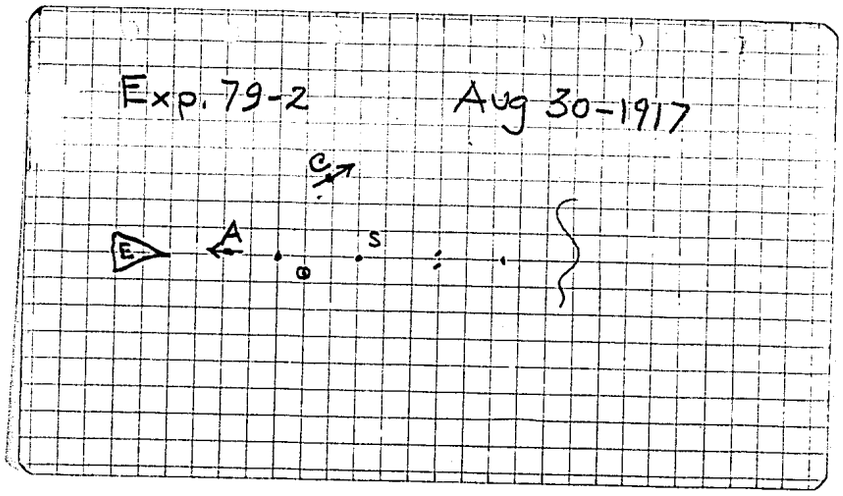

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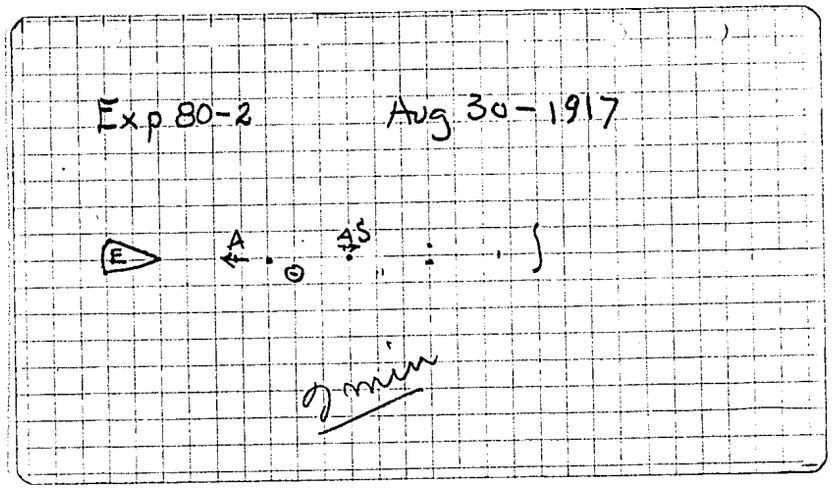

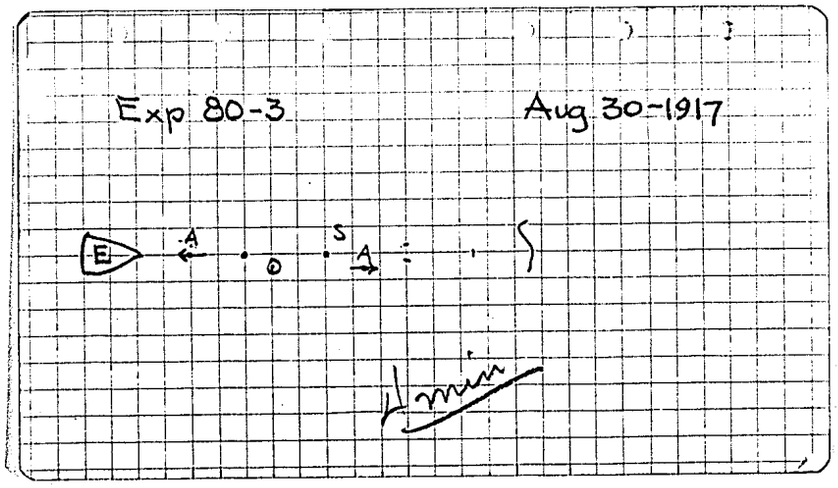

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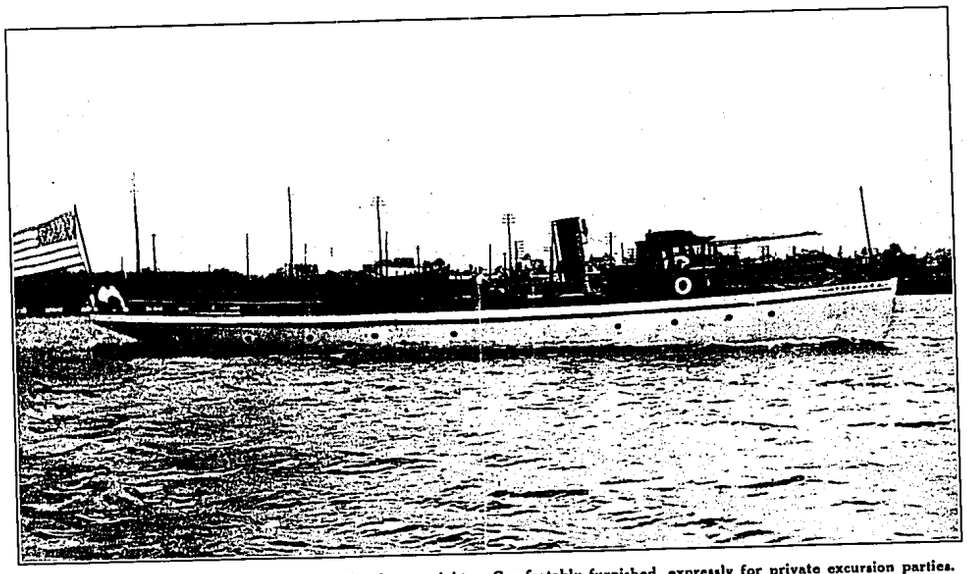
Private Excursion Yacht "HYDRAULIC"



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